



Led by the Advanced Space Transportation Program at Marshall

Propellant-free propulsion system to be developed

The Propulsive Small Expendable Deployer System — ProSEDS — will be developed under the Future-X space technology development program.

ProSEDS, led by the Advanced Space Transportation Program at the Marshall Center, is a tether designed to pull or push a spacecraft, acting as a brake or booster.

"This will be a demonstration of a propellant-free propulsion system," said Les Johnson, the ProSEDS principal investigator with Marshall's Advanced Space Transportation Program. "We expect that it will reduce the cost of space transportation."

Leslie Curtis leads the team of Marshall engineers and scientists at the Center developing ProSEDS.

ProSEDS is a tether that will "plug in" to the same physics principle that powers electric motors. Forces can be generated by sending a current through a wire loop — i.e., an electrical circuit — while it lies in a magnetic field. In space, one part of the electrical circuit is a long tether attached to an orbiting spacecraft. The return path of the circuit is supplied by electrically charged gas in the ionosphere. The magnetic field is supplied by Earth. When properly controlled, the forces generated by this "electrodynamic" tether can be used as a brake or a booster.

The ProSEDS flight will demonstrate braking. The payload will be attached to the second stage of a Delta II rocket launching a pair of U.S. Air Force

navigation satellites. Normally, these stages slowly spiral back to Earth over the next half year, as atmospheric drag nibbles at their speed. By generating an electrical current, ProSEDS will turn itself into an electromagnetic brake.

"We're going to show an orbital decay of at least three miles a day," Johnson explained. "It's not quick compared to a retrorocket, but it is much faster than natural decay. And it's being done without the use of any propellant."

Johnson expects ProSEDS to operate for only one to three days; atomic oxygen erosion or other space hazards may limit its lifetime. But a more rugged operational unit could make an expended second stage re-enter Earth's atmosphere in about 14 days.



NASA photo by Dennis Keim

U.S. Reps. Rohrabacher, Gordon tour Marshall

Engineer Tom Delay, left, with Marshall's Productivity Enhancement Complex, briefs, from right, U.S. Rep. Dana Rohrabacher of California, and U.S. Rep. Bart Gordon of Tennessee, during a visit to the Marshall Center Jan. 21. Delay explained how Marshall materials process engineers are using a new graphite epoxy technology to create lightweight cryogenic fuel lines for vehicles such as the X-33 Advanced Technology Demonstrator. NASA Administrator Dan Goldin, second from left, and NASA associate administrator for Space Flight Joseph Rothenberg, third from left, accompanied the group for a Marshall overview and tour of Center facilities.

Center's Science@NASA Web site nominated for Internet award

Marshall Center's "Science@NASA" Web site is one of four sites nominated for the Internet's "Webby Awards." Science@NASA is the only U.S. government Web site nominated for a 1999 Webby.

Often referred to as the "Oscars of the Internet," the Webby Awards are sponsored by the International Academy of Digital Arts & Sciences. The awards recognize Internet sites for creativity and innovation.

"We're thrilled to have been nominated," said Dr. John Horack, director of science communications at Marshall's Space Sciences Laboratory. "We try hard to communicate NASA science to people from all walks of life."

Other science category nominees are Scientific American; the University of Arizona Biology Project; The Union of Concerned Scientists; and last year's winner, The San Francisco Exploratorium. The Webby Award ceremony is March 13 in San Francisco.

"Safety begins with me"

Safety slogan submitted by James Turner, EB14

Shipment of Chandra delayed

by John Bryk

NASA last week announced that it will delay this month's planned shipment of its Chandra X-ray Observatory from prime contractor TRW Space and Electronics Group, Redondo Beach, Calif., to Kennedy Space Center, Fla. The postponement will allow TRW to evaluate and correct a potential problem with several printed circuit boards in the observatory's command and data management system.

In mid-January, TRW notified NASA of the potential problem after another spacecraft being built by the company experienced a failure during testing that was attributed to similar printed circuit boards. The failed boards and those in Chandra were all made by BF Goodrich Aerospace, Davis Systems Div., Albuquerque, N.M., in the same time frame in 1996. The problem has been traced to poor conductivity between different layers of the boards.

The boards are used in Chandra's main command and telemetry unit and four remote units. These units provide command and data communications links between the observatory's computer and subsystems.

NASA directed TRW to remove and replace the boards in the main unit, and to conduct further tests and evaluation to determine if it also is necessary to replace the boards in the remote units. The repair, if limited to boards in the main command and telemetry unit, is expected to delay shipment to Kennedy by approximately one week. This will result in approximately a five-week slip in the observatory's launch readiness date, which will allow for integration and testing of the units at Kennedy. If boards in the remote units must also be replaced, a more extensive slip is anticipated.

The writer, a contractor employed by ASRI, supports the Media Relations Office at Marshall. He covers the Chandra Observatory.

At the Marshall Center

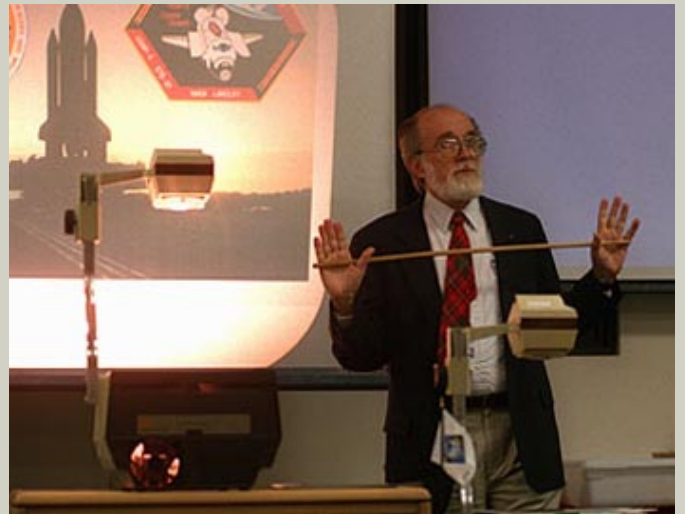
ISO self-assessment continues

by Tom Dollman

All Marshall organizations within the scope of the Center's Quality Management System continue the self-assessment process in preparation for February's external ISO audit.

The ongoing activity focuses on six specific elements: management responsibility; design control; inspection, measuring, and test equipment; control of nonconforming product; internal quality audits; and corrective and preventative action. Marshall organizations which handle specific products, that is, flight hardware or software or ground support equipment which interfaces with flight hardware and software, are those which are particularly cognizant of two of these elements.

To ensure Marshall delivers quality products, procedures have
See ISO self-assessment on page 4



NASA photo by Emmett Given

Researchers discuss STS-87 mission results

Dr. Archibald Fripp discusses results from the fourth flight of the U.S. Microgravity Payload during a Jan. 22 meeting at the Marshall Center. Fripp was joined by researchers from universities and NASA centers across the United States to discuss the 16-day, 1997 Space Shuttle mission on which seven major experiment payloads were managed by the Microgravity Research Program at Marshall.

Dumbacher named deputy director of Marshall's Propulsion Lab

Dan Dumbacher has been appointed deputy director of the Propulsion Laboratory in the Science and Engineering Directorate at the Marshall Center. He currently serves as NASA's X-33 deputy program manager at Lockheed Martin Skunk Works in Palmdale, Calif.

Dumbacher began his federal career in 1979 as a summer engineering aide assigned to the Engineering Analysis Division, Structures and Propulsion Laboratory at Marshall. In 1981, he received a career appointment as an aerospace engineer in Marshall's Structures and Propulsion Laboratory.

Throughout his career, Dumbacher has been deeply involved in managerial and technical aspects of high propulsion technology. He left the Marshall Center for a brief time in 1985 to work for industry at Teledyne-Brown Engineering, serving as a field office representative for project management.

In 1987, he returned to Marshall as chief engineer, Alternate Turbopump Development, Space Shuttle Main Engine Chief Engineers. Other assignments include technical assistant to the director, Propulsion Laboratory; assistant manager, Space Shuttle Main Engine Projects; and a one-year detail in the Space Shuttle Program Office at NASA Headquarters in Washington, D.C.



Dan Dumbacher

Upcoming Events

Marshall to celebrate Black History Month

To commemorate Black History month in February, the Marshall Center Black History Committee has several events planned. The theme "The Legacy of African American Leadership for the Present and the Future" will be highlighted during a Black History Month program at 9 a.m. Wednesday, Feb. 17 in Morris Auditorium.

Dr. Dorothy Huston, vice president of research and development at Alabama A&M University in Huntsville, will speak. The Alabama A&M University Choir, under the direction of Richard Tucker, also will perform.

A cultural arts exhibit will be displayed 9 a.m.-3 p.m. in the Bldg. 4200 lobby. Various impressions include works by Center employees, according to committee chairwoman Carolyn Landry.

Other Center events planned for the month-long celebration include:

"Down Home Blues" lunches

Feb. 5 —Bldg. 4203 cafeteria

Feb. 17 —Bldg. 4610 cafeteria

Soul food will be featured as a manager's lunch special.

Marshall employees will provide musical entertainment from 11:30 a.m.-12:30 p.m.

Brown bag lunch seminar

Feb. 9

11:30 a.m.-12:30 p.m.

John Helmke of the U.S. Treasury Department will brief employees on savings bonds and present the new I series bond honoring Dr. Martin Luther King Jr.

Black history tour

Feb. 24

10 a.m.-noon

Employees are invited to tour the State Black Archives Research Center and Museum at Alabama A&M. Bus service will be provided and seating will be on a first-come, first served-basis. Contact Rita Evans-McCoy at 544-7507 by Feb. 19 for reservations.

Music Hall of Fame Induction Friday

The Alabama Music Hall of Fame Eighth Induction Banquet and Awards Show is 8 p.m. Friday at the Von Braun Center South Hall.

Five music achievers from the State of Alabama — The Temptations, Wilson Pickett, Bobby Goldsboro, David Briggs and Donna Hilley — will be inducted into the Hall of Fame.

Marshall's NASA Exchange in Bldg. 4752 will sell 100 reserved gallery seats at \$20 each. For more information, contact Rosa Kilpatrick of Marshall's Government and Community Relations Office at 544-0042.

All-hands meeting 2 p.m. Friday

An all-hands meeting will be held at 2 p.m. Friday in Morris Auditorium. Center Director Art Stephenson will share plans and the schedule for the proposed Marshall Center reorganization. The meeting also will be shown on closed-circuit television.

Scholarship applications available

Applications are being accepted for six scholarships to be awarded by the NASA College Scholarship Fund Incorporated.

The fund, set up in 1982 through an endowment by author James Michener, provides college scholarships for qualified dependents of current or retired employees of NASA and dependents of current reimbursable detailees to NASA. In addition, college scholarships may be awarded to full-time students who are dependents of former NASA employees or reimbursable detailees to NASA who died while employed by NASA.

Six \$2,000 scholarships will be awarded for the 1999-2000 school year. The renewable scholarship is for a maximum of \$8,000 over six calendar years. Applicants must be pursuing a course of study in the science and engineering fields that will lead to a recognized undergraduate degree at an accredited college or university in the United States. Application forms and details are available in Bldg. 4200, room 312-F, or at the NASA Exchange in Bldg. 4752. Deadline for submitting applications is March 31.

Since 1984, six Marshall dependents have been received NASA College Scholarship Fund scholarships. Recipients include Constantine Costes, Sandor Lehoczký, Darcie Reasoner, Jack Loose, Neeklaksh Kumar Varshney and Katie Lynn Davis. Contributors to the NASA College Scholarship Fund include the Freedom Forum, the Johnson Space Center Chapter of the Alumni League and NASA employees through the Combined Federal Campaign.

Permit required to operate appliances

by Judy Milburn

A special permit is required for the operation of portable appliances with heating elements at the Marshall Center.

MSFC Form 3798 "Permit for Portable Appliances" must be posted in all areas equipped with appliances such as coffee pots, heaters, urns, hot plates, ovens and grills.

To obtain approval for a permit, employees must contact their safety monitor who will complete the conformance to fire protection checklist on the form. MSFC Form 3798 is available from Marshall's Industrial Safety Office in Bldg. 4203, sixth floor, or call 544-0046.

The writer is with Marshall's Industrial Safety Office.

ISO self-assessment

Continued from page 2

been established and documented to control, calibrate and maintain inspection, measuring and test equipment including test software. This equipment is used by Center organizations to demonstrate product conformance to specified customer requirements. Individuals performing tests on these products must be sure that the test equipment yields accurate readings. MSFC-P11.1, "Control of Inspection, Measuring, and Test Equipment" establishes a comprehensive calibration and metrology program providing for the management of standards, inspection, measurement, test equipment and test software in a controlled process.

Products built at Marshall or shipped from one of its partners

or vendors found non-conforming to specified requirements, must not be used in an unintended fashion. MSFC-P13.1 "Control of Nonconforming Product" establishes policy, responsibilities and procedures for controlling nonconforming products, including proper disposition.

Individual and organizational commitment to calibration, metrology and controlling nonconforming product is necessary to ensure Marshall's external customers get the quality products we have committed to provide to them. More audit-specific information, including sample questions about the six elements, may be found on the ISO Home Page at the following Web site: <http://iso9000.msfc.nasa.gov:9001/index.html>

The writer is with Marshall's Technology Transfer Office.

Employee Ads

Miscellaneous

- ★ NordicTrack Pro with workout computer. 830-1403
- ★ Yamaha console organ with bench, two keyboards, pedals, rhythm section, w/organ course, \$325. 534-2368
- ★ Connelly blade runner wakeboard, large bindings, \$100. 881-0533
- ★ Two tickets, "The King and I" matinee, Feb. 28, VBC, center loge, \$30.50 each. 881-0278
- ★ Old F14 Goodyear tire and wheel, \$8; 10-gallon aquarium with extras, \$8. 721-0617
- ★ Sofa, chair and two solid cherry end tables. 534-4450
- ★ 1997 Astro 20' fish and ski boat, 200 HP, less than 20 hrs., fish finders, GPS, \$22,000 obo. 922-1169
- ★ Kenmore washer and dryer, extra large capacity, \$100 each o.b.o. 830-1346
- ★ GE undercounter dishwasher, \$85; steel bookcases, various colors, \$12-\$20 each; snowskiing clothes. 881-6040
- ★ Kenwood TS-440SAT HF radio, CW filter, PC-ready with matching power supply, \$675. 881-0533
- ★ AKC toy poodles, starting at \$250 each. 753-2278
- ★ Murray big wheel, 5HP, self-propelled lawn mower, \$100; Alvarez acoustic guitar w/ case, \$375. 247-1402
- ★ Ice cream maker, \$20; vented gas logs, \$30; industrial sink w/faucets, \$15. 931-438-0476
- ★ Walker Turner 10" pedestal table saw w/ 45"x32.5" table (rips 24") and 1.5 HP Rockwell motor, \$550. 721-9904

Vehicles

- ★ 1992 Ford Ranger, XLT package, extended cab, 4L, V-6, automatic, A/C, 87K miles. 771-2002
- ★ 1993 Lincoln, Mark VIII, 64K miles, leather, CD, all power, \$11,950. 650-0852
- ★ 1990 Dodge, D50, 5-spd., 140K miles, \$3,600. 922-5727
- ★ 1990 Chevy P30 Tiffin, open road motor home, 34K miles, \$22,000. 734-4838
- ★ 1987 Pontiac GrandAm SE, V6, 120K miles, new tires, \$3,500 obo. 882-2076
- ★ 1985 Ford F-150 pickup, auto, air, Delta tool box, replacement 6 cylinder engine, \$2,700 obo. 534-8186
- ★ 1992 Nissan Sentra, 117K miles, red, 2-dr., \$3,000. 650-3731
- ★ 1996 Pontiac Transport, 7/8 passenger, PDL/PW, \$10,500. 772-7042
- ★ 1991 Toyota Camry LE, 4-dr., almond, moonroof, power package, cruise, \$5,700 obo. 880-1544
- ★ 1994 Chrysler LHS, leather seats, CD player and changer, sunroof, maintenance records, \$9,925. 722-0417
- ★ 1987 VW Jetta, approximately 110K miles, \$2,500 o.b.o.; 1992 Plymouth Voyager, approximately 130K miles, \$4,500 o.b.o. 880-8174
- ★ 1997 Ford Explorer XLT, 4-dr., V-8, \$18,300. 880-6679
- ★ 1994 Nissan Quest GXE, 96K miles, power windows/seats/sunroof, tow package, alloy wheels, \$13,700. 773-4461

Wanted

- ★ Slide trays for Kodak carousel projector; ladder jacks. 881-6040
- ★ HO scale train set, separate train cars or track. 498-5520

Center Announcements

- ✦ **MOO** — The Management Operations Office (MOO) retirees will meet for breakfast/lunch at 10 a.m., Thursday, Jan. 28 at the Cracker Barrel in Madison. All present or former MOO employees and retirees are invited. **Contact:** 539-0042
- ✦ **Valentine Dinner Dance** — The MARS Ballroom Dance Club Valentine Dinner Dance will be held Saturday, Feb. 13 at the Von Braun Center. The semi-formal event will begin with a social at 6:30 p.m., a buffet dinner at 7 p.m., followed by dancing from 8 to 11:30 p.m. Tickets, which cost \$18 per person with a \$3 discount for members, may be purchased from Tamara Landers at 544-0563; Pat Sage at 544-5427; Ed Ogozalet at 837-1486; Linda Kinney at 544-0563; and Bob Williams at 544-3998. Reservations for a table of eight can be made by calling Woody Bombara at 650-0200.
- ✦ **Toastmasters** — The NASA Lunar Nooners Toastmasters Club will meet at 11:30 a.m., Tuesday, Feb. 2 in the Bldg. 4610 cafeteria conference room. All Marshall employees, contractors and friends are invited. **Contact:** Lee Johns, 544-5241
- ✦ **Vacation travel** — Executive Tour & Travel Service, Inc., through the NASA Exchange at Marshall, is offering a Disney/Epcot area hotel package of 4 days/3 nights for \$139 for two adults and two children up to 12 years of age. A deposit of \$70 is required by Feb. 26, however, travel dates are good through February 2000. Flyers are available at the Marshall Activities Bldg. 4752 or for more information call Executive Tour & Travel at 1-800-272-4707. The NASA Exchange account reference is ER11583-005 and is available to Marshall employees, retirees, and on-site contractors.

MARSHALL STAR

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